urethane oligomer (A) includes a tertiary amine such as triethylamine, N,N-dimethylbutylamine, tributylamine, triallylamine, N,N-dimethylallylamine, N-methyldiallylamine, N,N-dimethylethanolamine, N,N-diethylmethanolamine, N,N-dibutylethanolamine, N,N-dimethylpropanolamine, N-methyldiethanolamine, N-ethyldiethanolamine, triethanolamine, N-methylmorpholine and N-ethylmorpholine; an alkali metal hydroxide such as sodium hydroxide and potassium hydroxide; and an alkali metal carbonate such as sodium carbonate and potassium carbonate. These basic compounds may be used alone or in the combination of two or more. An aqueous solution of the basic compound is preferably added to the urethane oligomer (A) dropwise under stirring to neutralize.

The unsaturated group-containing polycarboxylic acid resin (B) used in the resin composition of the present invention is a reaction product of the epoxy resin (e) having two or more epoxy groups per molecule, the ethylenically unsaturated group-containing monocarboxylic compound (f) and the polybasic acid anhydride (b-2).

The epoxy resin (e) having two or more epoxy groups per molecule to use for preparing the unsaturated group-containing polycarboxylic acid resin (B) includes a glycidyl ether such as an epoxy resin represented by Formula (1) as shown above, a bisphenol A type epoxy resin, a bisphenol F type epoxy resin,

a phenol novolac type epoxy resin, a cresol novolac type epoxy resin, a trisphenol methane type epoxy resin, a brominated epoxy resin and biphenol type epoxy resin; an alicyclic epoxy resin such as 3,4-epoxy-6-methylcyclohexylmethyl-3,4-epoxy-6-methylcyclohexane carboxylate, 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane carboxylate, and 1-epoxyethyl-3,4-epoxycyclohexane; a glycidyl ester such as phthalic acid diglycidyl ester, tetrahydrophthalic acid diglycidyl ester, and dimeric acid glycidyl ester; a glycidylamine such as tetraglycidyl diaminodiphenyl methane; and a heterocyclic epoxy resin such as triglycidyl isocyanurate. The epoxy resin represented by Formula (1) is preferable. The n in Formula (1) is calculated from an equivalents of the epoxy and is generally about 1-20, preferably about 1-15.

The epoxy resin (e) represented by Formula (1) can be obtained by reacting the alcoholic hydroxyl group of the epoxy compound for a raw material where M is hydrogen in Formula (1) with an epihalohydrin such as epichlorohydrin. The epoxy compound for a raw material is available on the market and includes a bisphenol A type epoxy resin such as EPICOAT series (trade name: EPICOAT 1009, 1031, made by Yuka Shell Epoxy KK), EPICLON series(trade name: EPICLON N-3050, N-7050, made by DAINIPPON INK AND CHEMICALS, INC.), and DER series(trade name: DER-642U, DER-673MF, made by Dow Chemical KK); and a bisphenol

F type epoxy resin such as YDF series (trade name: YDF-2004, 2007, made by Tohto Kasei KK).

The epoxy compound for a raw material is preferably reacted with the epihalohydrin under the presence of dimethylsulfoxide. The epihalohydrin may be used in the amount of 1 equivalent or more per 1 equivalent of alcoholic hydroxy group of the epoxy compound for a raw material. However, even if 15 equivalent or more per 1 equivalent of alcoholic hydroxy group are used, it provides little effect or rather brings about a bad capacity efficiency. The quantity of the alcoholic hydroxide can be determined by a conventional method such as the titration method and the IR method. However it is usually calculated from equivalents of the epoxy.

An alkali metal hydroxide is usually used for carrying out the above reaction. The alkali metal hydroxide includes sodium hydroxide, potassium hydroxide, lithium hydroxide, and calcium hydroxide. Sodium hydroxide is preferable. The alkali metal hydroxide is satisfactorily used in the amount of about 1 equivalent per 1 equivalent of alcoholic hydroxy group to epoxidate of the compound represented by Formula (2). It may be excessively used for epoxidating all the alcoholic hydroxy groups of the compound represented by Formula (2). However, the use in the amount of 2 or more equivalent of the hydroxide per 1 equivalent of alcoholic hydroxy group have a tendency to